FINANCIAL INCLUSION FOR DEVELOPMENT: WHAT DOES THE LITERATURE SAY

A Thesis

Presented to the Faculty of the Graduate School

of Cornell University

In Partial Fulfillment of the Requirements for the Degree of

Master of Public Administration

by

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BIOGRAPHICAL SKETCH

Stephanie Coker is a second–year student at the Cornell Institute for Public Affairs, where she is pursuing a Master of Public Administration. Her concentration is in the area of Economic and Financial Policy. She is interested in the implementation and impact evaluation of social enterprises and economic development projects at the international level. Prior to Cornell, Stephanie served as an AmeriCorps VISTA at Habitat for Humanity managing projects and doing research evaluation. Stephanie has participated twice in Cornell's Student Multidisciplinary Applied Research Team program trip to Rwanda and has consulted for the International Livestock Research Institute in Kenya. Currently, Stephanie is a member of the American Evaluation Association's (AEA) 2016-2017 cohort of the Graduate Education Diversity Internship (GEDI) fellowship. As part of the GEDI cohort, Stephanie presented on the topic of mobile money at the AEA 2016 conference.

I would like to dedicate this to Kenneth, my most avid fan.

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CHAPTER 1

Introduction and Methodology

How it all began

The 2000 Millennium Development Goals established by the United Nations provided a universally agreed upon set of objectives for all its member nations to follow. The first Goal that was identified was the elimination of poverty. , Eradication of poverty subsequently became the focus of many initiatives by many organizations and governments around the world. As a way to address some of the problems related to poverty, Mohamed Yunus started a micro-credit scheme in Bangladesh that would later develop into microfinance. As organizations began to realize that microfinance needed to expand beyond banking and lending the term financial inclusion became prominent in the 2010s (citation). Currently the term financial inclusion applies to a set of activities that seek to ensure that all households and businesses, regardless of income level, have access to and can effectively use the appropriate financial services they need to improve their lives (CGAP http://www.cgap.org/about/faq/what-financial-inclusion-and-why-it-important)

The World Bank Group estimates that, globally, about two billion people lack access to a transaction account (UFA2020 Overview, n.d.). Since the spring of 2015, the World Bank Group alone has committed over $8 billion in activities that will increase financial inclusion (UFA2020 Overview, n.d.). **Outcomes measured by social scientists are mostly positive.**. Between 2011 and 2014, for instance, microfinance activities decreased the number of financially excluded individuals by

20% (UFA2020 Overview, n.d.). However, there is still ongoing debate about the true impact of microfinance activities on alleviating poverty, with some research studies finding that microfinance has no impact on poverty reduction. (Dichter 2010, p.2).

How the topic has been addressed

Since 1998, several evaluations have aimed to assess the true impact of microfinance activities on individuals, households and microenterprises. While the majority of studies have used randomized control trials, others have utilized quasi-experimental methodologies to overcome practicality barriers (Beck 2015). Results have been mixed, with some forms of microfinance activities faring better that others (Bauchet et al 2011). Just by searching for impact evaluations of microfinance interventions, it is apparent that the number of impact evaluations of microfinance interventions has increased exponentially. With this phenomenon, the need has also increased for studies that can review and synthesize literature on the topic. Additionally, with the increasing focus on results-based management, agencies that fund such interventions are keen to observe signs of positive impact.

There has also been an increase in systematic reviews of microfinance. Mixed results also appear in systematic reviews of microfinance impact evaluations (Bauchet et al 2011, Duvendack et al 2011, Van Rooyen et al 2012). Reviewers have suggested that mixed results occur because of the weakness of evaluation designs which excludes many evaluations at the screening stage or simply, the failure of microfinance to accomplish its goals. Furthermore, previous systematic reviews have not yet incorporated evaluations of mobile money, an exciting and innovative approach to financial inclusion (source). Mobile money is thought to help to achieve some of the

goals that microfinance initially set out to achieve and is generally considered by thinkers in the field as a microfinance activity (source). By presenting what is out there in the field of microfinance impact evaluation, a scoping review can present a clearer view of what literature currently exists and provide incentive for future investment in a particular kind of methodology, intervention outcome or even a geographical region.

As defined by Mays, Roberts and Popay (2001), a scoping review sets out to "map rapidly the key concepts underpinning a research area and the main sources and types of evidence available, and can be undertaken as stand-alone projects in their own right, especially where an area is complex or has not been reviewed comprehensively before". In a field as complex as microfinance, a scoping review will be particularly helpful in examining the magnitude, range and characteristics of evaluation research activity on microfinance. With a scoping review, I also aim to incorporate elements of systematic mapping to present results. I will following the scoping review methodology pioneered by Arksey and O'Malley (2005) and further developed by Daudt et al (2013).

The basis of impact evaluation

Impact evaluation design rests on many methodological features. Identifying a theory of change and establishing a valid counterfactual are essential to any impact evaluation. As I conduct a review, I will be looking for evidence of theories of change and counterfactuals. As mentioned in the World Bank's Impact Evaluation in Practice, theories of change are especially important if the program/initiative is seeking to change behavior (Gertler 2011 p. 22). Following from this theory of change, the ideal

method of estimating the counterfactual is the use of a comparison group (Gertler 2011, p. 37). This group must be identical in almost every way to the group who is receiving the program benefits. The best research methodologies that produce valid comparison groups are RCTs (Gertler 2011 p. 38). Other methodologies have to use other, more complicated approaches to set up a counterfactual. Additional methodological considerations to be examined are sample size of population being studied, the length of time that is allowed for a significant change to take place, the local contexts of each intervention, and the presence of a causal claim. Using these methodological features as screening criteria, I will conduct a scoping review of microfinance impact evaluations.

Methodology

My methodology consists of three main steps. These are article gathering and de-duplication, abstract screening and descriptive statistics. I aim to gather impact evaluation studies from academic databases which were published from 2011 to 2016. While it would have been ideal to also conduct a search of grey literature sources, it cannot be included within the scope of this review because of time limitations. The databases that I use cover many fields of study, such as the social sciences and business:

1. CAB Abstracts
2. ECONlit database
3. SocIndex
4. ABI/Inform

My search terms are:

1. Microfinance
2. Impact evaluation
3. Micro-credit
4. Microloan
5. Micro-insurance
6. Mobile money
7. Savings mechanisms
8. Savings circles
9. Microfinance Institution
10. MFI
11. Grameen
12. M-PESA
13. Kiva

Where possible, I will use this Boolean search string:
microfinance OR "micro finance" AND microcredit OR micro-credit OR "micro credit" AND "micro loan" OR microinsurance OR micro-insurance OR "micro insurance" OR "mobile money" OR "mobile-money" OR "savings mechanism" OR "savings and loans" OR "savings circles" OR micro-loan OR "micro loan" OR "micro finance institution" OR "micro-finance institution" OR MFI OR Grameen OR M-PESA OR KIVA AND "impact evaluation".

After de-duplicating articles, abstract screening is done with the EndNote program. With abstract screening, articles are excluded from the list if:

1. Articles are from journals which are not peer reviewed
2. Articles are not about impact evaluation
3. Articles do not cover the following microfinance activities:
    a. Microfinance
    b. Micro-credit
    c. Micro-insurance
    d. Mobile money
    e. Savings mechanisms
    f. Savings circles
4. Uses quantitative methods to assess impact

After applying exclusion criteria, I will classify all studies by the type of intervention, quantitative methods used, sample size and geographic location. To present and illustrate my findings, I will use and provide a count of each classification category for relevant combinations of classes and use descriptive statistics with frequency totals. For example, I will compare the type of intervention with the quantitative method used to see if there are any trends that emerge. I also aim to use GIS mapping to portray counts of each classification category and how they relate to geographic location.

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Daudt, H., Van Mossel, C. & Scott, S. (2013). "Enhancing the scoping study methodology: a large, inter-professional team's experience with Arksey and O'Malley's framework". BMC Medical Research Methodology. http://bmcmedresmethodol.biomedcentral.com/articles/10.1186/1471-2288-13-48

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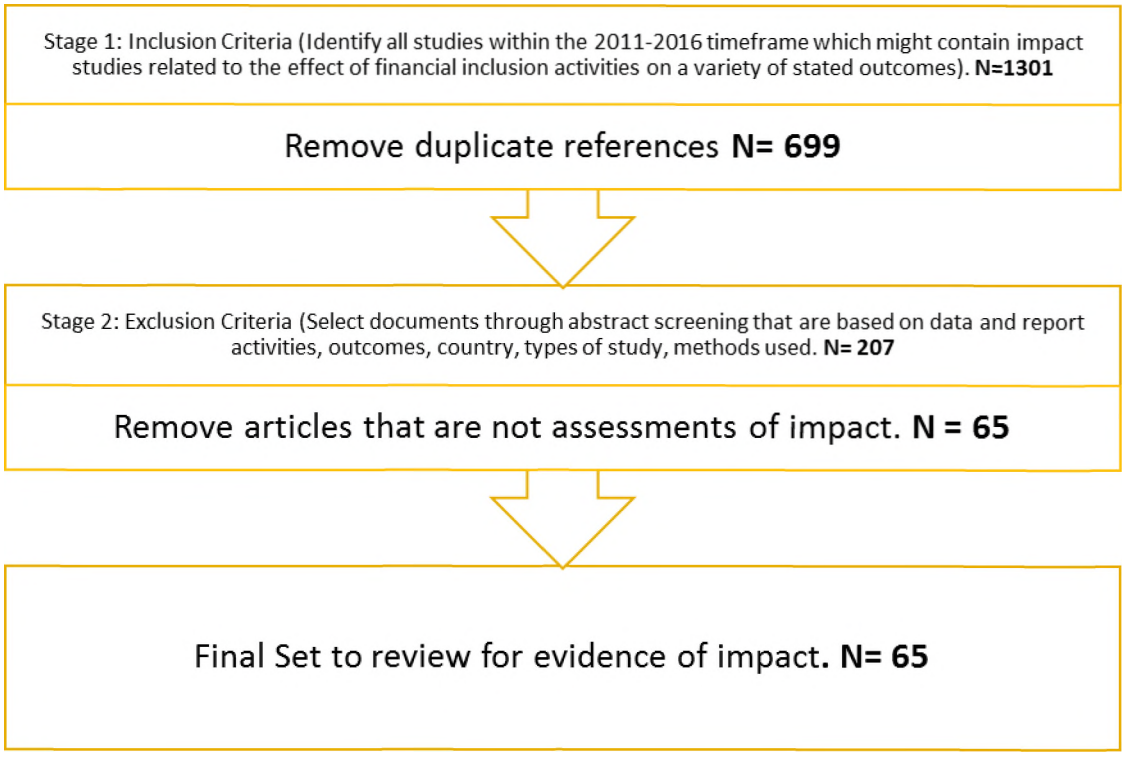
CHAPTER 2

Analysis And Discussion

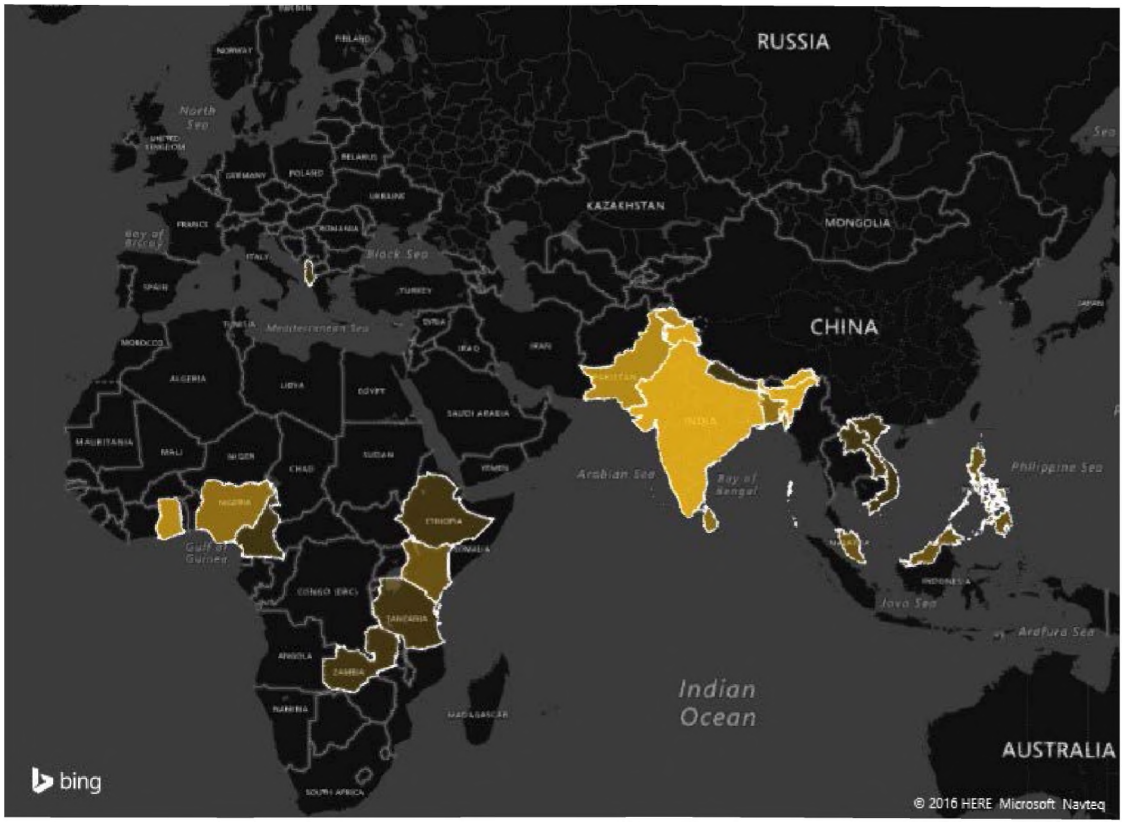
Stages of Review

The diagram below shows the results of the different stages of data collection.The first stage of the study yielded 1301 studies. After removing duplicates, 699 articles were left. Multiple exclusion criteria were applied to the set of studies using abstract screening. In this stage, studies were selected according to whether or not conclusions were based on data. This resulted in 65 studies which were then tabulated with information about report activities, outcomes, country, type of study and methods used.

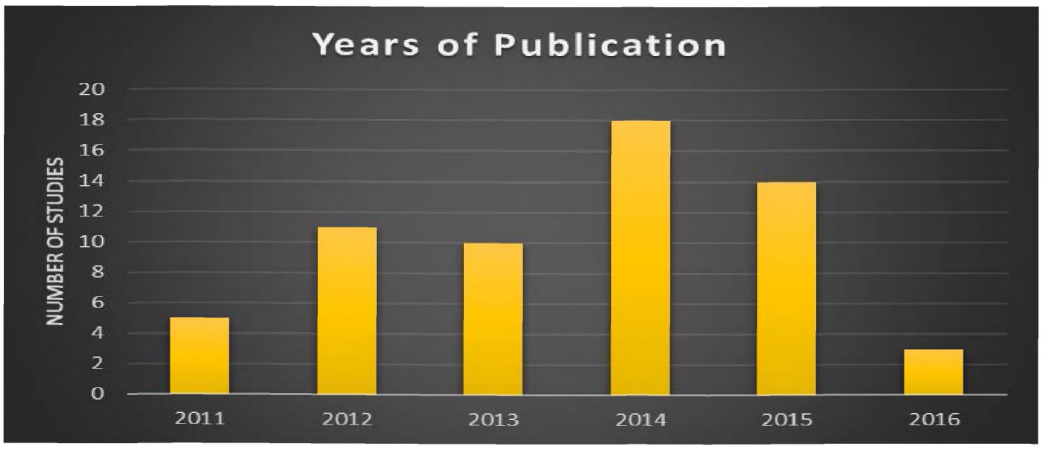


Analysis of data

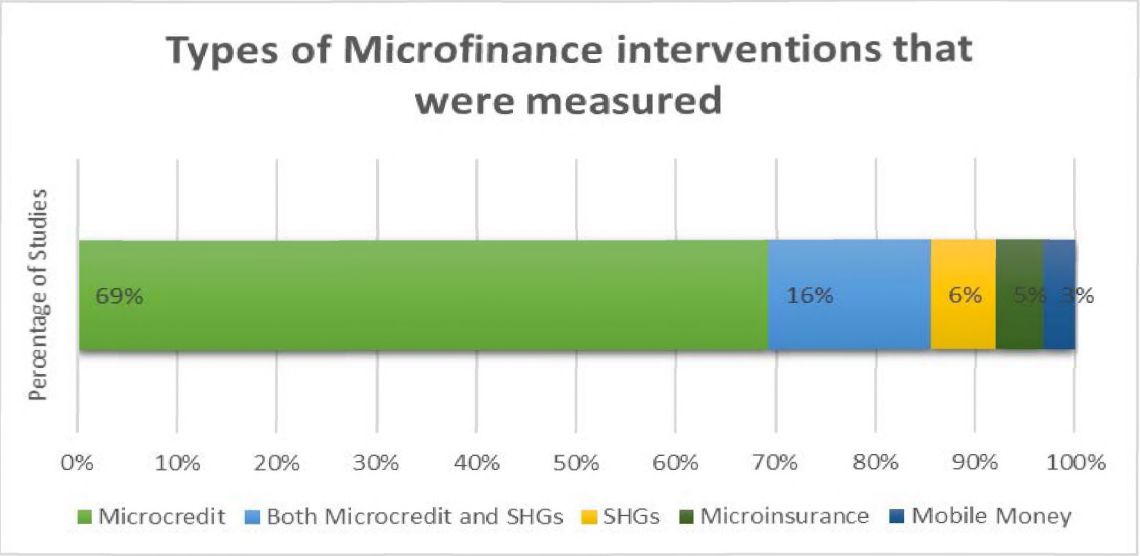
The following map shows the number of studies conducted around the world from the final 65 set. India, Bangladesh, Nigeria and Ghana have the most studies with evaluation of financial inclusion activities (insert table about countries).



The majority of studies were also published in 2014.

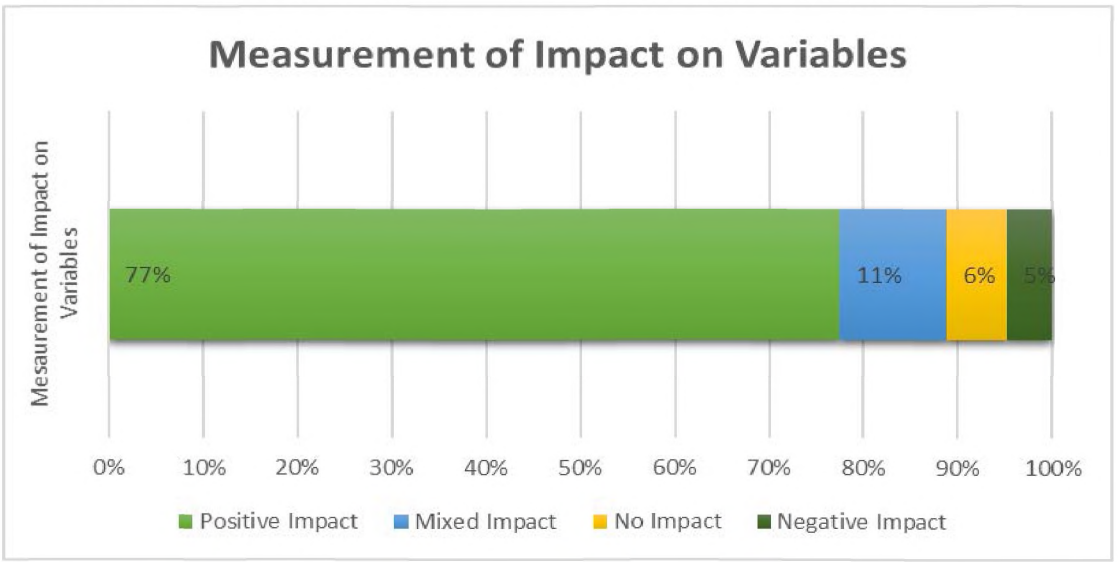


As stated in Chapter 1, studies were gathered based on whether or not they measured impact of the following financial inclusion activities: micro-credit, self-help groups, mobile money and microinsurance. 69% of studies were focused on micro-credit, 16% was based on micro-credit and self-help groups, 6% on self-help groups and 5% on microinsurance and 3% on mobile money.



There were a variety of outcomes present in the 65 studies. These include studies measuring impact on income, poverty as a whole, economic assets, social capital and female empowerment. A full accounting of studies is included in the appendices.

77% of studies measure positive impact, 11% report mixed (both positive and negative) impact, 6% report no impact and 5% report negative impact.



A variety of analytical methods were used in the studies. Due to the ambiguity surrounding the way in which researchers report their findings, some methods were easier to understand than others. Most studies used cross-sectional research designs, some randomization and statistical regression analysis, with few using qualitative methods or supplementing their design with qualitative methods. These methods are documented in the appendices.

Discussion

With the wide variety of indicators that are used to assess impact, there is an under-specification of outcome variables and a need for a multi-dimensional index that captures the essence of the microfinance theory of change. Next, the fact that the majority of studies identified impact is moot because the vast majority of the studies that I looked at had severe problems with internal validity. Therefore, my findings mirror previous studies that identify that there is a scarcity of stalwart studies that provide a warrant for causal inference.

This might mean that we have to go back to the drawing board in terms of program design and use more qualitative analyses. For evaluations, it also means that we need to continually ask, "what does success look like?". Regardless of whether your topic of interest is microfinance, evaluators need to be the catalyst to articulate that evaluation designs are sufficiently thorough in order to adequately inform program design.

CHAPTER 3

A Scoping Review of Mobile Money Interventions

Introduction

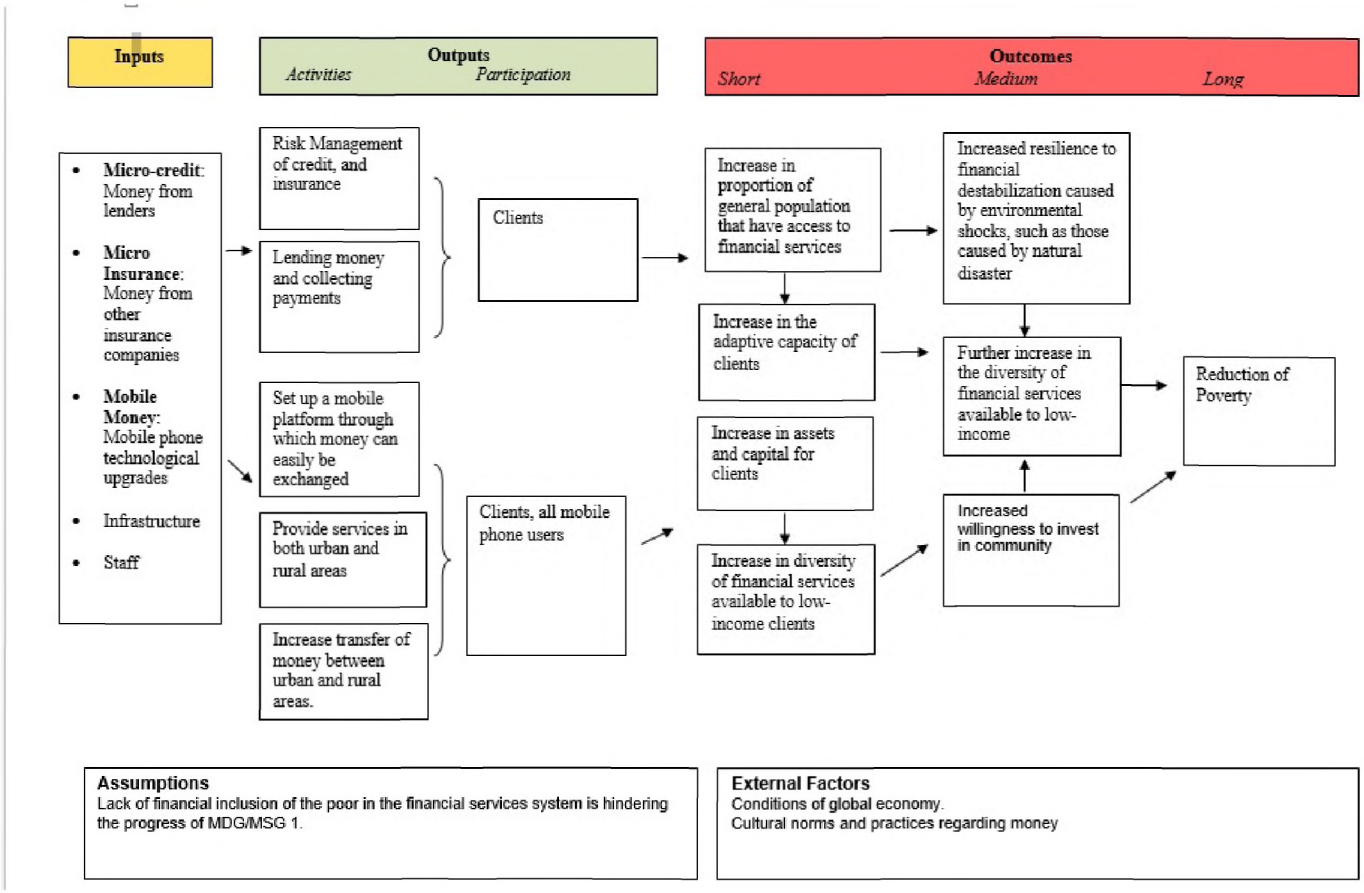
Mobile money has recently emerged as one of the most promising microfinance strategies. Donovan (2012) defines mobile money as the provision of financial services through a mobile phone. Potential advantages include benefits arising from the inherent characteristics of the services; benefits arising organically from widespread usage by individuals and among social networks; and benefits arising from purposeful and innovative applications, either made by developers or created by people's uses of mobile money services (Donovan 2012, p. 63). However, the mobile money industry is still young, and many questions about it remain unanswered. Impact evaluations of mobile money activities remain scarce in comparison to impact evaluations of other microfinance activities, such as microcredit.

Impact evaluations remain the primary way of measuring the impact of policies and initiatives. The objective of an impact evaluation is to establish a pathway for causality and tests its logic. A rigorous impact evaluation can provide policy-makers and program managers with information that verifies the effectiveness of a program and improves public service delivery. The following systematic two-stage review of six impact evaluations of mobile money initiatives will shed some light on theories of change associated with mobile money, underlying assumptions needed to establish congruency of theory, counterfactuals, and causal pathways.

Impact Evaluation: Objectives and Methodological Features

A good impact evaluation design rests on many methodological features. Establishing a valid research counterfactual and identifying a theory of change are essential to any impact evaluation. The concept of a counterfactual, first popularized through Rubin's Causal Model, is in this context, "what the outcome would have been for program participants if they had not participated in the program" (Gertler 2011 p. 8). A theory of change is a logical sequence of events that tracks the mechanism of a program as it generates certain outcomes. Theories of change are especially important if the program/initiative is seeking to change behavior (Gertler 2011 p. 22). While there is not yet a consensus on what constitutes a valid microfinance theory of change, I will present a potential framework for a microfinance theory of change. In Figure 1, mobile money is included as an input in microfinance, along with microcredit and micro-insurance. Its pathway of causality is then traced to the goal of breaking the cycle of poverty through financial inclusion. As is shown, mobile money is only one facet of a whole set of microfinance services that will lead to the stated goal. This is a key fact when determining the extent of the impact mobile money activities will make on reducing poverty, because it contends that mobile money activities do not lead to significant impact unless combined with other microfinance activities. The impact of mobile money activities on consumer behavior, that is, may not by itself lead to the reduction of poverty.

Figure 1: Microfinance Logic Model



Following from this theory of change, the ideal method of estimating the counterfactual is the use of a comparison group (Gertler 2011, p. 37). This group must be identical in almost every way to the group who is receiving the program benefits. The best research methodologies that produce valid comparison groups are randomized control trials (RCTs) (Gertler 2011 p. 38). Other methodologies have to use other, more complicated approaches to set up a counterfactual. In the case of mobile money activities, the comparison group can be established by sampling from both users and non-users. Nonetheless, assignment of who uses mobile money activities should be randomized for the purposes of measuring impact, in order to

prevent selection bias. Using evidence from prior research data unrelated to the current impact evaluation study may also be a valid way to design a comparative study. However, if prior research is used, additional efforts must be made to prove that the mined data adequately represents the state of the population without the treatment, in the state of the world where both treatment and non-treatment are possible. Furthermore, evaluation methods that do not use randomization turn out to be inherently biased. For example, propensity score matching as an evaluation method faces severe limitations to its internal validity because it relies heavily on the assumption that unobserved characteristics that affect both participation and outcomes do not exist (Gertler 2011, p. 114). To avoid bias, the use of randomization in evaluating mobile money services is necessary.

Other methodological considerations to be examined when undertaking an impact evaluation are the sample size of the population being studied, the length of time allowed for a significant change to take place, the local contexts of each intervention, and the presence of a causal claim. Using these methodological features as tools for analysis, in the analysis that follows I will conduct a two-stage review. The first stage focuses primarily on the internal validity of each impact evaluation, while the second stage delves deeper into the counterfactuals presented, the rate of change of the intervention, and the results of the study. At the end of the first stage, I will select impact evaluations of mobile money that have passed internal validity checks and use these for my second stage review. To conclude, I will present recommendations for future mobile money impact evaluations, based on my second stage analysis.

First Stage Review

An extensive search was made through the following databases to identify impact evaluations of on mobile money services:

1. EBSCOhost
2. World Bank Impact Evaluations Database
3. International Initiative for Impact Evaluation database
4. Abdul Latif Jameel Poverty Action Lab database
5. Innovations for Poverty Action search project
6. University of California Center for Effective Global Action (CEGA): Research Projects
7. Asian Development Bank: Economic Research Publications
8. National Bureau of Economic Research: Working Papers and Publications
9. The International Growth Centre: Publications
10. ECONlit database

The search terms were "mobile money," "microfinance," and "M-PESA." Six impact evaluations relating to mobile money were found. Criteria used to analyze impact evaluation reports are summarized in Tables 1, 2 and 3.

Table 1 Analysis

	Table 1: Impact Evaluations Location and Intervention				
Study #	Title	Author(s)	Location	Description of Intervention	Effect of Intervention on:
1	Risk Sharing and Transactions Costs: Evidence from Kenya's Mobile Money Revolution (Source: EBSCOhost)	William Jack and Tavneet Suri	Kenya	Usage of M-PESA by individuals	Household consumption, employment
2	Impact of Mobile Money Usage on Microenterprise :Evidence from Zambia	Laura Frederick	Zambia	Usage of mobile money accounts by Microenterprises	Microenterprises' profits
3	The Impacts of Mobile Money Services on Subsistence Marketplaces in Rural Cambodia	Jeff Fang	Cambodia	Basic financial services using WING mobile phone technology	Financial capability of subsistence consumer and entrepreneur communities, consumer wellbeing of subsistence consumer and entrepreneur communities, and subsistence entrepreneurship as a whole
4	Mobile Banking: The Impact of M-Pesa in Kenya	Isaac Mbiti and David Weil	Kenya	M-PESA : Mobile Money remittances	M-PESA competitor prices, bank use, employment, use of inofrmal savings mechanisms
5	Impact of mobile phone-based money transfer services in agriculture: evidence from Kenya	Oliver K. Kirui, Julius J. Okello, Rose A. Nyikal	Kenya	Usage of three types of Mobile Money Techonology	Household agricultural input use, agricultural commercialization and farm incomes among farm households
6	Promises and Pitfalls of Mobile Money in Afghanistan: Evidence from a Randomized Control Trial	Joshua Blumenstock, Michael Callen, Tarek Ghani	Afghanistan	M-PAISA: Mobile salary payments	Indicators of wealth/well-being: likelihood of sending and receiving money transfers, increase in savings, usage of M-PAISA during violent periods

Because mobile money is a relatively new intervention, it is important to understand the reasons why it has been implemented in certain locations, why impact evaluations' designs vary depending by location, and how impact evaluations vary by type of mobile money technology. Table 1 displays the country of implementation and a brief description of each intervention. This information is important because different methodologies are appropriate for different types of interventions; for example, impact evaluations of M-PESA are retrospective because the release of M-PESA in Kenya was not accompanied by a simultaneous impact evaluation study; furthermore, widespread uptake of M-PESA technology was only established after

years of successful marketing, which delayed its evaluation. On the other hand, impact evaluations done of mobile money services in Cambodia, Afghanistan and Mozambique are prospective in nature. For retrospective impact evaluations of M-PESA, the burden of proof to establish causality is heavier without a ready-made counterfactual, and therefore researchers must compensate with more sophisticated evaluation designs or risk a loss of internal validity.

As is evidenced by the last two columns of Table 1, mobile money impact evaluations vary regarding what constitutes implementation of mobile money activities. In Studies 1, 2, 3, and 6, the usage of mobile money services are used by researchers as a measure of treatment; Study 4 uses mobile money remittances, and Study 7 uses mobile money salary payments. More importantly, each study uses different indicators to measure impact. According to the microfinance framework of change that I have outlined, outcomes should broadly relate to an increase in individual or household wealth and improved resilience to shocks[1]. All studies except Study 2 produce estimates on individual or household wealth. Although Study 2 focuses on impact on microenterprises, which creates a longer and more complex causal chain, the proliferation of microenterprises does not necessarily lead to poverty reduction; this fact therefore eliminates the need for further consideration of Study 2. I will not include Study 2 in my second stage analysis for this reason.

[1], For further discussion about resilience in international development, see Barrett and Constas (2013). "Toward a theory of resilience for international development applications". Proceedings of the National Academy of Sciences, vol. 111 no. 40, 14625–14630. Retrieved from: doi: 10.1073/pnas.1320880111

Table 2 Analysis

In Table 2, technical aspects of each impact evaluation are reviewed. These technical aspects are components of research methodological design and include evaluation method, study design and data, and presence of a counterfactual. As a counterfactual is needed to establish proof of causality, Study 3 is eliminated from the second-stage review because it does not present a stated counterfactual. Additionally, for reasons stated earlier in my Objectives and Methodological Features section, it is important that the evaluation methods use randomization. Hence, Study 7 is eliminated from my second stage review because it uses propensity score matching.

	Table 2: Impact Evaluations Methodological Design				
Study #	Title	Author(s)	Counterfactual present (Y/N)	Evaluation Method (s)	Data
1	Risk Sharing and Transactions Costs: Evidence from Kenya's Mobile Money Revolution (Source: EBSCOhost)	William Jack and Tavneet Suri	Y	Difference-in-differences, IV	Panel Data (two points in time)
2	Impact of Mobile Money Usage on Microenterprise :Evidence from Zambia	Laura Frederick	N	IV	Non-randomized sample in one market
3	The Impacts of Mobile Money Services on Subsistence Marketplaces in Rural Cambodia	Jeff Fang	N	Most Significant Change (Qualitative)	Non-randomized stakeholders
4	Mobile Banking: The Impact of M-Pesa in Kenya	Isaac Mbiti and David Weil	Y	IV, Difference-in-differences	Balanced Panel Data (two points in time)
5	Impact of mobile phone-based money transfer services in agriculture: evidence from Kenya	Oliver K. Kirui, Julius J. Okello, Rose A. Nyikal	Y	Propensity Score Matching	Cross-sectional data
6	Promises and Pitfalls of Mobile Money in Afghanistan: Evidence from a Randomized Control Trial	Joshua Blumenstock, Michael Callen, Tarek Ghani	Y	RCT	Randomized panel data

Second-Stage Review

After eliminating 3 studies, the remaining three are analyzed based on whether their evaluation answers their causal claim, whether they have valid counterfactuals, and

whether they leave enough time between baseline and endline studies. Reviewing this information will reveal the logic behind what actually sparks economic changes for users of mobile money and if the research methodology for each study is appropriate for the logic. Results of the analyses are presented in Table 3. Right away, it is clear that although Study 1 and Study 4 do have counterfactuals, they are what Gertler et al. refer to as counterfeit counterfactuals. Gertler et al. (2011) identify two ways in which counterfeit counterfactuals can be generated: before and after comparisons, and through enrolled and non-enrolled comparisons (p. 40). Study 1 relies on data from non-users of M-PESA and uses this data to form a comparison group. However, using data from non-users of M-PESA introduces selection bias and will bias estimates of impact. Study 4 relies on a before and after comparison of periods when M-PESA was available and not available. This method also creates biased estimates, because this comparison is based on the assumption that if M-PESA had never existed, the outcome for M-PESA users would have been exactly the same as their pre M-PESA situation. Because of these methodological concerns, Study 1 and Study 4 are eliminated as models for future mobile money impact evaluations.

	Table 3: Impact Evaluations Causal Claims and Counterfactuals				
Study #	Title	Author(s)	Causal Claim	Counterfactual (s)	Time Lapse
1	Risk Sharing and Transactions Costs: Evidence from Kenya's Mobile Money Revolution (Source: EBSCOhost)	William Jack and Tavneet Suri	(i) The consumption of M-PESA users should respond less to shocks than that of nonusers; (ii) To the extent that these differences arise from differences in remittance behavior, remittances should respond more to shocks for M-PESA users than for nonusers; (iii) The network of active participants should be larger for users than nonusers	Comparison group consisting of non-MPESA users. Falsification test using pre-MPESA data	3 years
4	Mobile Banking: The Impact of M-Pesa in Kenya	Isaac Mbiti and David Weil	Mobile money causes decreases in the use of informal saving mechanisms such as ROSCAS, and increases the probability of being banked.	Before and after M-PESA comparison	n/a
6	Promises and Pitfalls of Mobile Money in Afghanistan: Evidence from a Randomized Control Trial	Joshua Blumenstock, Michael Callen, Tarek Ghani	Mobile money salary payments cause improvements in financial well-being of users	Control group consisting of employees who were paid using existing cash mechanism	1 year

Finally, it is worthwhile to examine the time lapse of each impact evaluation because with any new program or intervention, enough time needs to pass in order to be able to observe changes. In Study 1, a 3-year lapse is observed by researchers, while in Study 4, an 8-year lapse is observed. In Study 6, researchers admit that a one-year time lapse may not be sufficient to study impacts of mobile money services (Blumenstock 2015, p. 8). In my conclusion and recommendation section, I present a summary of my findings and the implications of each finding. I will also make recommendations for future impact evaluations of mobile money services.

Key Findings and Recommendations

After conducting a two-stage review of studies that estimate the impact of mobile money on a number of indicators, it is evident that only Study 6 is conducted with a valid counterfactual, a robust evaluation method, and a random assignment. All the other studies are eliminated by other criteria. Yet Study 6 possibly still does not provide enough time for impact attributable to the mobile money program to emerge.

Furthermore, the researchers of Study 6 admit that a larger sample size would aid in detecting smaller impacts. Thus, there are several implications that arise from my findings:

1. The true impact of mobile money cannot be estimated with the M-PESA retrospective studies, because of the presence of counterfeit counterfactuals.
2. A wide variety of valid instruments can be used to determine impact using IV analysis. Instruments used in the studies I have reviewed are household consumption, income, employment, and changes in the use of safe saving mechanisms,
3. Because the demographics of users and non-users of mobile money services may vary greatly between groups, random assignment of treatment is a necessity to eliminate selection bias.
4. Although qualitative impact evaluations of mobile money provide information about which indicators are best in local contexts, it is extremely difficult to claim causality without a counterfactual. This means that causal claims are difficult to verify,
5. Time lapses must be a year or more in order to estimate income; otherwise, sample size needs to be large enough to detect minute changes in impact estimates.

The following recommendations proceed from these implications:

1. Quantitative impact evaluations of mobile money activities should only be carried out if an RCT is possible. Otherwise, counterfeit counterfactuals and selection bias are present, and true impact cannot be measured.

2. As of yet, qualitative impact evaluations of mobile money do not present a valid method to claim causality.
3. Impact evaluations of mobile money should consider mobile money as one slice of the pie that makes financial inclusion possible. Therefore, future impact estimates should be examined with at higher levels of significance.
4. Further qualitative studies can reveal new, more accurate measures of impact as research is conducted.

Moving forward, these recommendations will be important for implementers and evaluators as they start new mobile money schemes. By adopting these suggested strategies, more robust evidence will emerge about whether or not mobile money is an effective tool for poverty alleviation. A widening pool of robust evidence can then inform decision-making at the highest levels, as both the public and private sectors figure out ways in which mobile money can be most useful to society.

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CHAPTER 4

Mobile Money for Agribusiness in Rwanda: A Case Study

Abstract

This case study explores the impact of mobile money services in Rwanda by explaining the characteristics of MTN mobile money services in Rwanda, exploring widespread usage and network effects and innovative applications of mobile money. In particular, the purposeful use of mobile money for agribusinesses is examined, as well as relationships between mobile money service providers and different segments of the population. The focus is on the role of mobile money in promoting agribusiness for commercial businesses and individual farmers, with special attention given to improvements in economic well-being for both segments. Data is collected from surveys and in-depth interviews conducted in Rwanda with Ikirezi Natural Products

Introduction

In Rwanda, the rapid expansion of mobile money across the country has begun to make a difference to economic growth, particularly in the rural areas. Rwanda's population is primarily rural, with only 28% of the population living in the urban centers (Population Reference Bureau, 2016). As such, mobile money is a platform that provides many opportunities for businesses conducting commerce or operations in rural areas.

Ikirezi Natural Products is an essential oils agribusiness founded in 2005 by Dr. Nicholas Hitimana. As a community-interest business, Ikirezi's vision statement is to be "a leading producer of high quality essential oils, and other natural plant products that maximizes profits to small farmers, holistically transforms communities and strengthens agri-business in Rwanda" (Ikirezi, 2014). The business model of Ikirezi incorporates social responsibility at its core, putting emphasis on hiring members of farmer cooperatives. With its primary operations located in rural areas, Ikirezi is currently exploring the potential for mobile money in increasing efficiency of its business processes and operations in rural areas. For Ikirezi, the potential to increase efficiency and efficacy is an important part of their goal of maximizing profits for farmers.

ICT and Mobile Technologies in Rwanda

In 2000, President Kagame launched Vision 2020, a plan which seeks to transform Rwanda into a middle-income country and transition from an agrarian economy to a knowledge-based economy by 2020[1]. Information and Communications Technology (ICT) was identified as a key enabler to achieve Vision 2020 and the Information Communication Infrastructure (NICI) plan was implemented to create an enabling environment for ICT, drive infrastructure development and develop a skilled workforce. The government's strategy is to make Rwanda into an ICT hub for the region.

Mobile money has grown steadily in Rwanda over the past decade. With the success of mobile money in other African countries, MTN, Tigo and Airtel began to offer mobile money services in 2009. Since then, many products and services have been launched including many person-person products, extended network coverage to rural areas and bill-pay services. Currently, up to 23% of the population has a mobile money account. As the Government of Rwanda continues to support private sector development, opportunities for agri-businesses to use mobile money will continue to grow.

Impact of Mobile Money Services in Other Countries

A handful of empirical studies document the impact of mobile money on several dimensions, including household income and consumptions, commercial profitability, economic assets and female empowerment. However, the mobile money industry is still young and there are many questions about it that remain unanswered.

The scarce literature has shown that mobile money usage has been beneficial to economic well-being in most cases. A handful of empirical studies document the impact of mobile money on several dimensions. Some have focused on impact of mobile money on saving behavior, flow of remittances, employment, business profits, mobile money competitor prices and financial capability, broadly speaking (refer to ch.3). Others measure impact as development of agricultural input use, agricultural commercialization and female empowerment (refer to ch.3).

Jack and Suri (2014) identify the positive impact of Kenyan M-PESA use on household consumption and employment. Through the bKash mobile money program that was launched by BRAC, Bangladeshi women in rural areas felt financially empowered. In Afghanistan, researchers also found that mobile money salary payments cause improvements in the financial well-being of users.

Other studies uncover mixed effects. Mbiti and Weil(2014) show that mobile money causes a decrease in the use of informal savings mechanisms while at the same time increasing the probability of being banked.

In particular, mobile money has also had a positive impact on economic well-being of agriculturalists. In 2014, Kikulwe et al. found that mobile money-based transfers have beneficial effects on livelihoods of farmers in Kenya through remittances which reduce risk and liquidity constraints. In Tanzania, a mobile money platform was shown to improve business operations for a commercial agribusiness and eliminated transportation costs for farmers who previously had to travel to receive payment. (Seetharam and Johnson 2015), As mobile money technology continues to spread, new measures of impact will need to emerge. Using research conducted in Rwanda, this case study suggests additional outcome measures that can be used to assess the impact of mobile money technology more comprehensively and will provide more context to the body of research on this topic.

Methodology of Research in Rwanda

The case study explores relationships between mobile money service providers and different segments of the population. In particular, the focus is on the role of mobile money in promoting agribusiness for commercial businesses and individual farmers, with special attention given to improvements in economic well-being for both segments.

This qualitative research was a part of a market analysis in collaboration with Ikirezi Natural Products, a Rwandan agribusiness. The research was based on the following questions:

1) What mobile money products and services are used by farmers? How does mobile money use affect the personal lives of users?

2) What part does mobile money play in agribusiness?

3) How does government policy facilitate mobile money?

Data was collected through a focus group and interviews with stakeholders. Convenience and purposive sampling methods were used to select interviewees that best matched the purpose of research. The stakeholders were Ikirezi staff, Ikirezi farmers and MTN Sales Manager, John -Paul Musugi. In-depth interviews were conducted with all four Ikirezi administrative staff and one Ikirezi farmer. Ikirezi staff consisted of the Managing Director, the Operations Manager, the Accountant and the Administrator. A focus group with farmers was comprised of two men and five women who were currently employed by Ikirezi. The locations of the interview were in Kigali, the Rwandan capital city and Gahara, the rural village were Ikirezi's farms are located. Surveys were carried out in English and Kinyarwanda which was translated with the help of a research assistant and the Ikirezi operations manager.

Ikirezi staff and farmers were asked questions about the use of mobile money in day-to-day business proceedings. They were also asked questions about the role that mobile money plays in their everyday lives. The MTN interview was focused on mobile money services, the use of mobile money in agribusiness and the wider role of mobile money in economic development.

Analysis

Interviews were transcribed and coded using thematic analysis. These codes were then categorized under common headings and given a hierarchical structure. The table below shows the codes that emerged from each interview.

Stakeholders	Emergent Themes

Ikirezi staff	• Opportunities that mobile money provides
	  ○ Accessibility to field operations as mobile money is are spread to rural areas
	  ○ Convenience of wage payment
	• Challenges associated with using mobile money
	  ○ Cost of mobile money services

Ikirezi farmers	• Convenience and accessibility • Additional services for paying bills • Saving incentive

MTN Interview	• The development of mobile money is a process of technology and innovation
	  ○ Additional services
	  ○ Customization of mobile money plan
	  ○ Process efficiency
	  ○ Excitement
	  ○ Learning from other countries
	• How does mobile money fit into society?
	  ○ Mobile money as part of a broader ecosystem
	  ○ Increased Accessibility
	  ○ Competition and Partnerships
	  • Social mission
	• What are some concerns that you face?
	  ○ Cost of mobile money service
	  ○ Government regulation
	  ○ Security and due diligence

Ikirezi Staff

Accessibility to field operations was identified as the primary advantage of using mobile money in Ikirezi. Because Ikirezi's Gahara site is located in the rural eastern part of Rwanda, the Operations Manager found mobile money useful for sending small amounts that are required for operational expenses. The administrative assistant commented on use of mobile money for operations: "It is used to send money to the field because there are some regular needs from the field that require small amounts of money each week or every few days". (Ikirezi Administrative Assistant, personal communication, Jan 11, 2017).' Ikirezi's managing director added, "We run full campaign of Tagetes harvesting sending mobile money to pay the harvesters every day to our technicians during the harvest period. This puts all of us at peace". (Ikirezi Administrative Assistant, personal communication, Jan 11, 2017).

Additionally, the convenience of wage payments to farmers is a distinct benefit of using mobile money. The operations manager stated that mobile money payments are used to pay farmers wages in Kiyombe, the

other Ikirezi field site because the payments are quicker and more convenient and there is no need of bank paperwork:

"In Gahara, farmers have an account in the bank so we deposit it directly into their account. But for the other site, we use mobile money… we send money through mobile money to the technician and he pays them". (Ikirezi Operations Manager, personal communication, Jan 11, 2017). Convenience also plays a part in sales: "Some of the[sic] customers, when they come here and don't have money on them, they send us the money, we see it on our phone and we give them the product and we withdraw it later." (Ikirezi Administrative Assistant, personal communication, Jan 11, 2017).

The cost of mobile money is seen as a barrier to further integrating mobile money into operations. The operations manager indicated that mobile money payments are sent through a single technician because if done directly, each mobile money transaction is charged. The managing director also stated that although they were exploring using bulk payment to farmers in Gahara it was still more expensive than putting money in the farmers' account.

Ikirezi Farmers

Out of the group of farmer interviews, only one did not have access to a mobile phone. However, she continued to use mobile money by borrowing the cell phone of her neighbor. One other farmer out of the focus group had access to mobile money but did not use it for mobile money purposes.

The main themes that emerged from the discussion about the use of mobile were positive. Farmers identified convenience and accessibility as the main reason for using mobile money. The farmer in the in-depth interview talked about how mobile money made it easy for him to pay his electric bill. He also discussed how easily he was able to send money to family and friends far away, in cases of emergency. Another farmer from the focus group also identified how helpful mobile money was when he needed money for emergencies. Both the in-depth interview and the focus group revealed the use of mobile money as a savings mechanism. One of the farmers stated that while he used mobile money to withdraw money and to transfer money, he also saves money on a mobile money account. (Ikirezi farmer from focus group, personal communication, Jan 12, 2017).

When asked what challenges farmers using mobile money faced, the farmers identified no challenges. After being prompted to elaborate further, the farmers revealed that accessibility to mobile phones is not a problem because people had mobile phones, or had access to a mobile phone through the community. One farmer also shared that although her phone had been stolen, she planned to get another phone soon.

MTN Sales Manager

Several themes were identified in the in-depth interview conducted with the MTN sales manager. After being asked to detail the history of mobile money use in Rwanda, he described the emergence of mobile money as a process of innovation, with customer interaction as a key element. He defined the process as exciting with the development of additional service dependent on customer interest and feedback: "P2P (Person-to-person payments) was something very exciting. People liked it [sic]. We saw the uptake was so quick , then we started adding other services like buying airtime, buying electricity, paying some bills like water bills. And then we started adding other corporate services like bulk payment. (MTN Sales Manager, personal communication, Jan 19, 2017). He also mentioned information-sharing between countries as a way of innovating: "I saw [savings groups][sic] in Ghana. They started a project (with) [sic] street sellers and now they are putting them together trying to make a project. We are working with them to see how mobile money can help." MTN Sales Manager, personal communication, Jan 19, 2017).

Learning from other MTN affiliates in Ghana also played a part in how MTN was able to form partnerships with traditional financial institutions. "In Ghana, I found that EcoBank was a pioneer in bringing mobile money to Ghana. I asked a manager in Ghana to help us engage the bank in Rwanda". He talked about how traditional banks were initially reluctant to partner with mobile money service providers: "They did not want to work with us until customers were removing their money from the banks to the other banks that work with mobile money". As banks realized that their own customers were beginning to use the availability of bank-affiliated mobile money services to evaluate banking accounts, banks began to form partnerships with mobile money service providers like MTN to make the provision of financial services more efficient: "We are helping them to decongest their counters. They don't need to employ six tellers anymore because they can

employ just three. People can just push money through their phones and don't need to go to the counters." He also remarked that microfinance institutions were quicker than other financial institutions to partner because they recognized the advantage it would give to their clients in rural areas.

The sales manager also described the partnerships that have been created with organizations in the agriculture sector. He explained how MTN has partnered with two international NGOs to provide mobile money accounts for farmers who receive microloans to promote the use of irrigation and fertilizers.

Discussion

With any qualitative study, results from analysis should always be understood within the context of production. The results from analysis of the interviews can be divided into two sets of implications: implications for agribusiness in Rwanda and implications for evaluators of mobile money.

Agribusiness:

The study revealed that small agri-businesses in Rwanda may use mobile money in a variety of ways for internal operations. In situations where farming sites are scattered across the country or where some sites are remote and rural, mobile money can serve as a quick and expedient method of paying wages. Results also suggest that in areas where consumer usage of mobile money is high, agribusiness retailers can expect to utilize mobile money for customer transactions.

From the analysis of the study, farmers seem to use mobile money more in three main ways: purchasing items, sending money to friends and relatives and saving. According to the farmers interviews, mobile money penetration in rural areas happened rapidly, with most of the people they know in their community having access to mobile phones. These results somewhat confirm trends measured by CGAP in 2015 and further research can be done to measure remittances across Rwanda.

The interview with MTN portrays an atmosphere of growth and innovation, spurred on by partnerships with traditional banks, NGOs and regulators. The mobile money industry also seems to be fast-paced and centered on design principles that focus on customer needs. This presents a great opportunity for agri-businesses and agricultural development organizations to harness the momentum that exists within the field.

Evaluation of mobile money:

This study yields some interesting suggestions for the future of evaluations of mobile money. Interviews with farmers portrayed evidence of outcomes that are already in the literature. The impact of mobile money for them seem to be centered on economic outcomes, such as saving, measures of increased accessibility to in-flows of cash from urban and finally, increased monetary connectedness of individuals to the community.

A measurement of increased efficiency in the operations of agribusiness may also be appropriate as an outcome, especially with regards to time and labor saved because of mobile money usage. To fully grasp the impact of mobile money on the economy of Rwanda, it will be appropriate to also measure number of new networks created within the financial industry, as well as, the adherence of mobile money services to design principles that are customer-centric. Overall, future evaluations may seek to explore these outcomes when measuring the impact of mobile money.

In conclusion, I have been able to explore the ways in which mobile money impacts the lives of farmers in Rwanda, the operations of agribusiness and the impact that mobile banking has on the wider financial ecosystem in Rwanda. As demonstrated through the scoping reviews I conducted, mobile money is just one tool out of the broader financial inclusion family that continues to demonstrate the impact on reduction of poverty worldwide. As the Sustainable Development Goals continue to be implemented, financial inclusion will remain a catalyst for change.

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APPENDIX

TABLE 1: STUDY TITLE AND YEAR

Author	Year of publication	Title	Country
Addae-Koranky, A.	2012	Microfinance and Poverty Reduction in Ghana. The Case of Central Region of Ghana	Ghana
Adebayo, C. O., S. A. Sanni and L. J. S. Baiyegunhi	2012	Microcredit scheme impact and food security status of beneficiaries in Kaduna State, Nigeria: a Propensity Score Matching approach	Nigeria
Adhikari, D. B. and J. Shrestha	2013	Economic impact of microfinance in Nepal: a case study of the Manamaiju village development committee, Kathmandu	Nepal
Agbaeze, E. K. and I. O. Onwuka	2014	Microfinance banks and rural development: the Nigeria experience	Nigeria
Akotey, J. O. and C. K. D. Adjasi	2015	Exploring the effect of microinsurance on asset inequality among households in ghana	Ghana
Alam, M. M. and R. I. Molla	2012	Inside Productivity of Microcredit in Bangladesh: A Surgical Analysis	Bangladesh
Al-Mamun, A., J. Adaikalam and M. N. H. Mazumder	2013	Measuring the Impact of Amanah Ikhtiar Malaysia's Micro Finance Program on Household Assets in Urban Peninsular Malaysia	Malaysia
Al-Mamun, A., S. A. Wahab, M. N. H. Mazumder and Z. Su	2014	Empirical investigation on the impact of microcredit on women empowerment in urban peninsular malaysia	Malaysia
Anna, Z.	2014	The impact of financial assistance on income: the case of women fish vendors in north coast of Java	Java
Anyiro, C. O., C. I. Ezeh, J. C. Ijioma and A. I. Udensi	2014	Local institutions' micro credit delivery and effects on rural farm households' poverty in Abia state, Nigeria	Nigeria
Awunyo-Vitor, D., V. Abankwah and J. K. K. Kwansah	2012	Women participation in microcredit and its impact on income: a study of small-scale businesses in the Central Region of Ghana	Ghana
Babajide, A.	2012	Effects of Microfinance on Micro and Small Enterprises (mses) Growth in Nigeria	Nigeria
Banerjee, A., E. Duflo, R. Glennerster and C. Kinnan	2015	The Miracle of Microfinance? Evidence from a Randomized	India

		Evaluation	
Bercaw, D. W.	2012	Empowering Women Through Microfinance: Microfinance Interventions in Ghana and South Africa	Ghana, South Africa
Bhuiyan, A. B.	2013	Microcredit and Sustainable Livelihood: An Empirical Study of Islamic and Conventional Credit on the Development of Human Capital of the Borrowers in Bangladesh	Bangladesh
Boateng, G. O., A. A. Boateng and H. S. Bampoe	2015	Microfinance and poverty reduction in ghana: evidence from policy beneficiaries	Ghana
Chopde, K. D., M. M. Kadam and V. O. Bondhare	2015	Role of self-help groups in rural credit for women empowerment	India
Das, A.	2014	Role of micro-credit disbursed through self help group with reference to purulia district, west bengal	India
Dattasharma, A., R. Kamath and S. Ramanathan	2016	The Burden of Microfinance Debt: Lessons from the Ramanagaram Financial Diaries	India
De Haan, L. and A. Lakwo	2010	Rethinking the Impact of Microfinance in Africa: 'Business Change' or Social Emancipation	Uganda
Dib, J. B., J. Lekocaj, M. Nikolla and E. Skreli	2014	Analysing the economic impact of Albanian savings and credit union on the farming activities in rural Albania	Albania
Doss, F. A. and K. N. Kalavani	2014	Impact of micro finance & women empowerment: a study with reference to bengaluru rural district	India
Dutta, K. P. D. and S. Panda	2014	Empowering women through self help groups: an empirical study	India
Dwivedi, P. K. and R. K. Sharma	2015	Micro Finance: Driver for Sustainable Economic Development	India
Estapé-Dubreuil, G. and C. Torreguitart-Mirada	2010	Microfinance and gender considerations in developed countries	Spain
Forgha, N. G., M. O. Mobit and D. G. Phungeh	2015	Mideno's schemes as agent of rural agricultural development: the case of maize production in Mezam division in Cameroon	Cameroon
Ganle, J. K., K. Afriyie and A. Y. Segbefia	2015	Microcredit: empowerment and disempowerment of rural women in Ghana	Ghana
Girabi, F. and A. E. G. Mwakaje	2013	Impact of Microfinance on Smallholder Farm Productivity in Tanzania: The Case of Iramba District	Tanzania
Hamid, S. A., J. Roberts and P. Mosley	2011	Can micro health insurance reduce poverty? Evidence from bangladesh	Bangladesh
Hansen, N.	2015	The Development of Psychological	Sri Lanka

		Capacity for Action: The Empowering Effect of a Microfinance Programme on Women in Sri Lanka	
Idolor, E. J. M. A. C. E. and P. O. P. Eriki	2012	Financial analysis of assessment of impact of micro-financing insitutions towards poverty reduction in nigeria*	Nigeria
Islam, A. A. I. m. e. and C. C. C. m. e. Choe	2013	Child labor and schooling responses to access to microcredit in rural bangladesh	Bangladesh
Jack, W., A. Ray and T. Suri	2013	Transaction Networks: Evidence from Mobile Money in Kenya	Kenya
Jack, W. and T. Suri	2014	Risk Sharing and Transactions Costs: Evidence from Kenya's Mobile Money Revolution	Kenya
Karlan, D. and J. Zinman	2011	Microcredit in theory and practice: using randomized credit scoring for impact evaluation	Philippines
Khan, A. R. and Z. Bibi	2011	Women's socio-economic empowerment through participatory approach: a critical assessment	Pakistan
Khan, T. H., M. E. Islam, M. I. A. Talukder and M. B. U. Khan	2013	Micro credit-women empowerment nexus explored: a study on the women of selected rural areas in Natore District, Bangladesh	Bangladesh
Kumar, S.	2013	Role of Microfinance in Empowerment of Women	Bangladesh
Kumari, P. W. N. A. and P. J. K. Singhe	2014	Poverty alleviation and long-term sustainability of microfinance project: with special reference to matale district	Sri Lanka
Lavoori, V. and R. N. Paramanik	2014	Microfinance impact on women's decision making: a case study of Andhra Pradesh	India
Mafukata, M. A., G. Kancheya and W. Dhlandhara	2014	Factors Influencing Poverty Alleviation amongst Microfinance Adopting Households in Zambia	Zambia
Mahmood, S., J. Hussain and H. Z. Matlay	2014	Optimal microfinance loan size and poverty reduction amongst female entrepreneurs in Pakistan	Pakistan
Mansoor, A., M. A. Jadoon and H. Arif	2012	Effect of micro-credit on agricultural production in selected villages of district Attock	Pakistan
Mukherjee, A. K.	2015	Empowerment through government subsidized microfinance program	India
Nirmala, V. and K. K. Yepthomi	2014	Self-help groups: a strategy for poverty alleviation in rural Nagaland, India	India
Nisha, B.	2014	Promoting micro-enterprise through SHG: a case study of MAVIM	India

Okon, D. P., N. A. Etim and A. A. A. Offiong	2012	Impact of micro credit scheme on rural farmers in Akwa Ibom State, Nigeria	Nigeria
Oscar Akotey, J. and C. Adjasi	2014	The Impact of Microinsurance on Household Asset Accumulation in Ghana: An Asset Index Approach	Ghana
Panda, P. K.	2014	Role of Micro Finance in Reduction of Domestic Violence Against Women: An Economic Analysis	India
Polk, S. W. and D. K. N. Johnson	2012	A Quantile Regression Analysis of Micro-lending's Poverty Impact	Philippines
Poon, J. P. H., D. T. Thai and D. Naybor	2012	Social capital and female entrepreneurship in rural regions: evidence from Vietnam	Vietnam
Rashid, S., R. N. Lodhi and Z. A. Saeed	2013	Effect of micro finance on poverty reduction of small scale farmers of Pakistan	Pakistan
Sabit, J. M. and A. Mohammed	2015	Role of Credit and Saving Share Company in Poverty Reduction in Rural Communities of Gumay District, Jimma Zone, South West Ethiopia	Ethiopia
Sayvaya, I. and P. Kyophilavong	2015	Does microfinance reduce poverty in Lao PDR?	Laos
Singh, U. B. and S. Vikas	2015	Understanding economic viability of self-help groups for poor: evidence of Varanasi district, Uttar Pradesh	India
Sulemana, A. and R. D. Dinye	2016	Microloans and Agricultural Sector Incomes in Developing Countries: An Empirical Study of the PRU District in Ghana	Ghana
Swamy, V. and B. K. Tulasimala	2013	Women financing and household economics	India
Tak, A. V. and V. B. Tak	2011	Microfinance, self-help groups and empowerment in Marathwada: a critical discussion	India
Tarozzi, A., J. Desai and K. Johnson	2015	The Impacts of Microcredit: Evidence from Ethiopia	Ethiopia
Tripathy, K. K. and S. K. Jain	2011	Income impact of micro-enterprise finance: an empirical study on government initiatives in rural India	India
Ukpe, O. U., N. J. Nweze and C. J. Arene	2016	Food insecurity vulnerability status of farm households in niger- delta, nigeria	Nigeria
Vachya, L.	2015	Microfinance livelihood initiatives and women empowerment in selected villages of Andhra Pradesh	India
Vipinkumar, V. P., P. S. Swathilekshmi, B. Johnson and	2013	Coastal indebtedness and impact of microfinance in marine fisheries	India

R. Narayanakumar		sector of Andhra Pradesh	
Washington, M. L. and Z. Chapman	2014	Impact of microfinance on entrepreneurial activty in emerging economies: panel data from argentina, brazil, colombia & south africa	Argentina, Brazil, Colombia, South Africa
Yogendrarajah, R.	2012	The impact of micro credit on women empowerment	Sri Lanka

TABLE 2: IMPACT. GEORGRAPHIC LOCATION, TYPE OF INTERVENTION AND STUDY

Author	Impact (No impact = 0, Positive = 1, Negative = 2, Mixed Effect = 3)	Continent (Africa = 1, Asia = 2, Europe =3, North America = 4, South America = 5, Caribbean = 6, Oceania = 7, South America and Africa = 8	Type of Microfinance Intervention (Microcredit = 1, Micro insurance = 2, Savings and loans associations/SHGs = 3, Mobile Money = 4)	Type of study (Quantitative = 1, Qualitative = 2, Quantitative and qualitative =3)
Addae-Koranky, A.	1	1	1	3
Adebayo, C. O., S. A. Sanni and L. J. S. Baiyegunhi	0	1	1	1
Adhikari, D. B. and J. Shrestha	1	2	1	3
Agbaeze, E. K. and I. O. Onwuka	1	1	1	1
Akotey, J. O. and C. K. D. Adjasi	1	1	2	1
Alam, M. M. and R. I. Molla	3	2	1	1
Al-Mamun, A., J. Adaikalam and M. N. H. Mazumder	1	2	1	1
Al-Mamun, A., S. A. Wahab, M. N. H. Mazumder and Z. Su	1	2	1	1
Anna, Z.	1	2	1	1
Anyiro, C. O., C. I. Ezeh, J. C. Ijioma and A. I. Udensi	1	1	1	1
Awunyo-Vitor, D., V. Abankwah and J. K. K. Kwansah	1	1	1	1
Babajide, A.	0	1	1	1
Banerjee, A., E. Duflo, R. Glennerster and C. Kinnan	3	2	1,3	1
Bercaw, D. W.	1	1	1	1
Bhuiyan, A. B.	1	2	1	1
Boateng, G. O., A. A. Boateng and H. S. Bampoe	1	1	1	1

Chopde, K. D., M. M. Kadam and V. O. Bondhare	1	2	3	1
Das, A.	1	2	1,3	1
Dattasharma, A., R. Kamath and S. Ramanathan	2	2	1	3
De Haan, L. and A. Lakwo	1	1	1	3
Dib, J. B., J. Lekocaj, M. Nikolla and E. Skreli	1	3	1	1
Doss, F. A. and K. N. Kalavani	1	2	1,3	3
Dutta, K. P. D. and S. Panda	1	2	3	1
Dwivedi, P. K. and R. K. Sharma	1	2	1,3	1
Estapé-Dubreuil, G. and C. Torreguitart-Mirada	1	3	1	1
Forgha, N. G., M. O. Mobit and D. G. Phungeh	1	1	1	1
Ganle, J. K., K. Afriyie and A. Y. Segbefia	3	1	1	2
Girabi, F. and A. E. G. Mwakaje	1	1	1	1
Hamid, S. A., J. Roberts and P. Mosley	1	2	2	1
Hansen, N.	1	2	1	1
Idolor, E. J. M. A. C. E. and P. O. P. Eriki	1	1	1	1
Islam, A. A. I. m. e. and C. C. C. m. e. Choe	2	2	1	1
Jack, W., A. Ray and T. Suri	1	1	4	1
Jack, W. and T. Suri	1	1	4	1
Karlan, D. and J. Zinman	1	2	1	1
Khan, A. R. and Z. Bibi	1	2	1	1
Khan, T. H., M. E. Islam, M. I. A. Talukder and M. B. U. Khan	1	2	1	1

Kumar, S.	1	2	1	3
Kumari, P. W. N. A. and P. J. K. Singhe	1	2	1	1
Lavoori, V. and R. N. Paramanik	1	2	3	1
Mafukata, M. A., G. Kancheya and W. Dhlandhara	1	1	1	1
Mahmood, S., J. Hussain and H. Z. Matlay	3	2	1	3
Mansoor, A., M. A. Jadoon and H. Arif	1	2	1	1
Mukherjee, A. K.	1	2	1	1
Nirmala, V. and K. K. Yepthomi	1	2	1, 3	1
Nisha, B.	2	2	1,3	3
Okon, D. P., N. A. Etim and A. A. A. Offiong	1	1	1	1
Oscar Akotey, J. and C. Adjasi	1	1	2	1
Panda, P. K.	1	2	1	1/3
Polk, S. W. and D. K. N. Johnson	1	2	1	1
Poon, J. P. H., D. T. Thai and D. Naybor	1	2	1	
Rashid, S., R. N. Lodhi and Z. A. Saeed	1	2	1	1
Sabit, J. M. and A. Mohammed	1	1	1	1
Sayvaya, I. and P. Kyophilavong	1* but insignificant	2	1	1
Singh, U. B. and S. Vikas	1	2	1,3	3
Sulemana, A. and R. D. Dinye	1	1	1	3
Swamy, V. and B. K. Tulasimala	1	2	3	3
Tak, A. V. and V. B. Tak	3	2	1,3	3
Tarozzi, A., J. Desai and K. Johnson	0	1	1	1
Tripathy, K. K. and S. K. Jain	3	2	1,3	1
Ukpe, O. U., N. J. Nweze and C. J. Arene	1	1	1	1

Vachya, L.	1	2	1,3	3
Vipinkumar, V. P., P. S. Swathilekshmi, B. Johnson and R. Narayanakumar		2		
Washington, M. L. and Z. Chapman	3	8	1	1
Yogendrarajah, R.	1	2	1	1

TABLE 3: METHODS USED AND OUTCOME VARIABLE

Author	Methods used	Outcome variable
Addae-Koranky, A.	Simple and stratifeid random sampling, focus groups, case studies, DID	Poverty reduction
Adebayo, C. O., S. A. Sanni and L. J. S. Baiyegunhi	Propensity-score matching	Food security
Adhikari, D. B. and J. Shrestha	Before and after	loaner's income, household income, household consumption, Savings, household assets, improvement in living standards, accessibility to credit, initiation of income generating activities
Agbaeze, E. K. and I. O. Onwuka	OLS,	banking habit , deposit mobilization, financial intermediation, job creation, capacity building of local people and opportunities to diversify the rural economy.
Akotey, J. O. and C. K. D. Adjasi	Chi-square test, With and without treatment	asset inequality
Alam, M. M. and R. I. Molla	Judgement sampling, Cobb-Douglas function	Economic productivity (business owners), women empowerment, job creation
Al-Mamun, A., J. Adaikalam and M. N. H. Mazumder	Quasi-experimental, Stratified random sampling	net worth of household assets
Al-Mamun, A., S. A. Wahab, M. N. H. Mazumder and Z. Su	Cross-sectional, Stratified random sampling	Women's empowerment
Anna, Z.	Regression analysis, Cross-sectional, Data Envelopment Analysis	Women's income and economic empowerment
Anyiro, C. O., C. I. Ezeh, J. C. Ijioma and A. I. Udensi	Multistage random sampling, paired t-test	mean annual farm income and monthly expenditures
Awunyo-Vitor, D., V. Abankwah and J. K. K. Kwansah	propensity score matching, nearest-neighbour matching, radius matching and kernel-based matching	income
Babajide, A.	panel data, multiple regression analysis	growth of micro and small enterprises
Banerjee, A., E. Duflo, R. Glennerster and C. Kinnan	RCT	Small business investment and profits of preexisting businesses increased, consumption did not increase, Durable goods expenditure increased, "temptation goods" expenditure declined
Bercaw, D. W.	Control groups, non-randomized sampling for South Africa, RCT for Ghana	women empowerment, (Female Empowerment Model)

Bhuiyan, A. B.	Stratified Random Sampling, Regression analysis	sustainable livelihood, personal confidence, sending their children for education
Boateng, G. O., A. A. Boateng and H. S. Bampoe	Descriptive research, Surveys	individual income, household growth, access to education, housing
Chopde, K. D., M. M. Kadam and V. O. Bondhare	Simple random sampling, panel data, descriptive statistics	expenditure, savings of women
Das, A.	Structured interview	Average income and savings, dependence on the local moneylenders
Dattasharma, A., R. Kamath and S. Ramanathan	financial diary methodology	household cash flows
De Haan, L. and A. Lakwo	onsensual people-centred relevance test, consistent triangulation, pipeline comparison approach, with and without, composite index analysis, regression and hypothesis testing analysis	poverty alleviation, gender and power relations
Dib, J. B., J. Lekocaj, M. Nikolla and E. Skreli	two-way causalities, regression, cross-tabulation and correlation analysis	farmers' income and activity
Doss, F. A. and K. N. Kalavani	knowledge and awareness, income increase and savings, women empowerment	convenient sampling, in depth interview , chi-square and ANOVA
Dutta, K. P. D. and S. Panda	Ex-post –facto research (quasi-exp)	four dimensions of women empowerment, that is, personal autonomy index, family decision making index, domestic economic consultation index and political autonomy index
Dwivedi, P. K. and R. K. Sharma	Regression analysis, NHT	GDP
Estapé-Dubreuil, G. and C. Torreguitart-Mirada	Regression analysis, Chi-squared test	social integration of immigrant women
Forgha, N. G., M. O. Mobit and D. G. Phungeh	Random cross-sectional Survey, multinomial logit regression. Expost Facto research	incomes of rural farmers by increasing agricultural output and improving their socio-economic environment
Ganle, J. K., K. Afriyie and A. Y. Segbefia	longitudinal qualitative research	women empowerment
Girabi, F. and A. E. G. Mwakaje	descriptive statistics and multiple regression analysis	agricultural productivity
Hamid, S. A., J. Roberts and P. Mosley	Cross-sectional, non-randomized control groups, multivariate regression	household income, stability of household income via food sufficiency and ownership of nonland assets, and the probability of being above or below the

		poverty line
Hansen, N.	Quasi-field experiment had a cross-sectional design with a treatment group and a comparison group.	psychological empowerment among women: personal (personal control beliefs) and social (social networks) capacity for action
Idolor, E. J. M. A. C. E. and P. O. P. Eriki	Ordinary Least Squares regression	education and life expectancy index
Islam, A. A. I. m. e. and C. C. C. m. e. Choe		children's education and child labor
Jack, W., A. Ray and T. Suri	IV	consumption smoothing in the face of shocks
Jack, W. and T. Suri		consumption smoothing in the face of shocks
Karlan, D. and J. Zinman	RCT	ability to cope with risk, strengthen community ties, and increase access to informal credit
Khan, A. R. and Z. Bibi	pre and post project scenario, regression analysis?	capacity building, access to micro credit, involvement in economic activities and reduction in the workload
Khan, T. H., M. E. Islam, M. I. A. Talukder and M. B. U. Khan	Survey, systematic random sampling	women empowerment
Kumar, S.	structured questionnaire, in-depth interview and observation, Focus Group Discussion	rural women's economic empowerment
Kumari, P. W. N. A. and P. J. K. Singhe	Descriptive analysis, , double difference method, and the regression analysis	income
Lavoori, V. and R. N. Paramanik	multi-stage stratified proportionate random sampling, multinomial logit regression	women empowerment as viewed from their participation in decision making, income as well as employment generation activities.
Mafukata, M. A., G. Kancheya and W. Dhlandhara	semi-structured questionnaire. descriptive data analysis, chi-squared test, log regression	
Mahmood, S., J. Hussain and H. Z. Matlay	semi-structured interviews	income, children's education, family health
Mansoor, A., M. A. Jadoon and H. Arif	systematic sampling, survey persoanl interviees	agriculture production, household income
Mukherjee, A. K.	Difference in difference, two period panel data	physical, economic and political components of empowerment, socio-cultural spaces of four socio-religious communities/caste
Nirmala, V. and K. K. Yepthomi	averages, ratios, percentages, Ordinary Least Squares (OLS) regression and Garret Ranking Technique	economic status and household wellbeing. Empowerment, independence and social participation.
Nisha, B.	case study, In-depth interviews through semistructured	promotion of micro-enterprise

	questionnaires	
Okon, D. P., N. A. Etim and A. A. A. Offiong	Survey questionnaire, multi-stage random sampling	household income, increase in household consumption,
Oscar Akotey, J. and C. Adjasi	multiple correspondence analysis, Heckman sample selection, instrumental variable and treatment effects models	household asset accumulation
Panda, P. K.	simple random sampling, survey	domestic violence
Polk, S. W. and D. K. N. Johnson	OLS and quantile multivariate regression models	Progress out of Poverty (PPI) Scorecard as a measure of poverty
Poon, J. P. H., D. T. Thai and D. Naybor	Longitudinal study, Stratified random sampling, semi-structured questionnaire	Self-employment condition of women
Rashid, S., R. N. Lodhi and Z. A. Saeed	self-structured questionnaire, regression and correlation	living of poor and employment generation
Sabit, J. M. and A. Mohammed	Purposive sampling techinques,. ANOVA, survey questionnaires	income, increase in quality and quantity of daily dish served for household improvements and consumption
Sayvaya, I. and P. Kyophilavong	cross-sectional data, regression analysis	household income and expenditure
Singh, U. B. and S. Vikas	Focus groups, systematic random sampling, one time data collection	
Sulemana, A. and R. D. Dinye	A case study and quasi-experimental methods	income and income disparity among actors
Swamy, V. and B. K. Tulasimala	multi-stage purposive random sampling design, Observation method, Questionnaire method, Mailed Questionnaire method and Telephone Interview.	food security, non-food expenses of the poor families
Tak, A. V. and V. B. Tak	Surveys, cross-validation or triangulation , with without two stage design (panel?)	incomes, and savings, reduces dependence on local money lenders, whether it enables women to have greater autonomy in household decision-making, reduces domestic violence against women, broadens their public domain, and induces a greater sense of bonding/reciprocity and building of associational capital
Tarozzi, A., J. Desai and K. Johnson	RCT	income, labor supply, schooling and women's empowerment
Tripathy, K. K. and S. K. Jain	Regression analysis	income
Ukpe, O. U., N. J. Nweze and C. J. Arene	Stratified random sampling, with/without	food insecurity vulnerability
Vachya, L.	logistic rgression, field survey	income, employment, women empowerment

Vipinkumar, V. P., P. S. Swathilekshmi, B. Johnson and R. Narayanakumar	Unclear	Unclear
Washington, M. L. and Z. Chapman	likelihood ratio, Lagrange multiplier and Hausman specification tests, OLS, panel data	Unclear
Yogendrarajah, R.	Regression analysis, coffiencient correflation, survey wuestionnaire, four stage random smapling	social empowerment, economic empowerment of women